

**NEU 440
Synaptic Transmission
Spring 2022**

Tuesday and Thursday 4:10 – 5:30 PM, *Biochemistry 111

Week	Date	Title	Assignment
1*	January 11	Introduction & Methods	
	January 13	Introduction & Methods; Membrane Potential	Ch. 1-3; presentation sign-up
2*	January 18	Membrane Potential	Ch. 1-3
	January 20	Action Potential	Ch. 4
3*	January 25	Action Potential	Ch. 4
	January 27	Electrical & Chemical Transmission	Ch. 5-6
4	February 1	Electrical & Chemical Transmission	Ch. 5-6
	February 3	Exam 1 Review	Exam 1
5	February 8	Calcium Homeostasis	Ch. 7
	February 10	Calcium Homeostasis	Ch. 7
6	February 15	Paper presentations	Chen-Engerer 2019; FF1
	February 17	Exocytosis and SNARE Complex	Ch. 8
7	February 22	Paper presentations	Courtney 2019; FF2
	February 24	Endocytosis	Ch. 9
8	March 1	Paper presentations	Cao 2017; FF3
	March 3	Receptors & Synapses	Ch. 10-12
9	March 8	University Break, No class	
	March 10	University Break, No class	
10	March 15	Receptors & Synapses	Ch. 10-12
	<i>March 17</i>	<i>No class; Exam 2 Review online</i>	<i>Exam 2</i>
11	March 22	Synaptic Plasticity	Ch. 14
	March 24	Paper presentations	Penn 2017; FF4
12	March 29	Acetylcholine	Ch. 16
	March 31	Paper presentations	Urban-Ciecko 2018; FF5
13	April 5	Amino Acid Transmitters	Ch. 18
	April 7	Paper presentations	Venkatesh 2019; FF6
14	April 12	Monoamines	Ch. 17
	April 14	Paper presentations	Burke 2018; FF7
15	April 19	Neuropeptides	Ch. 19
	April 21	Others (Cannabinoids, Cell Adhesion Proteins, Glucocorticoids)	
16	April 26	Paper presentations	Stoeber 2018; FF8
	April 28	Exam 3 Review	Exam 3

This syllabus is tentative and subject to change at the instructor's discretion.

Course Coordinator

Andrew Eagle, Ph.D.

Office Hours: Tues 5:30-6:30pm Biochem 208 or by appt in Zoom

Office Phone: 517-353-2476

Email: eaglea@msu.edu

Zoom meeting details for Class (when online) and Office Hours:

Zoom link: <https://msu.zoom.us/j/96449704436>

Passcode: synaptic

Dial by phone: +1 312 626 6799 US (Chicago)

One Tap Mobile: +13126266799,,96449704436# US (Chicago)

Meeting ID: 964 4970 4436

***Special Note: As per University recommendations the class will be held in a synchronous online format at the same time over Zoom. This will occur for at least the first 3 weeks of class, unless otherwise noted. Office hours will also be in Zoom at the same time. Please make appropriate accommodations.**

Course Materials and Required Reading:

Course Website: We will be using D2L (<https://d2l.msu.edu>) for our course website. The general, course-wide D2L site will be administered by Dr. Andrew Eagle and will contain announcements, assignments, papers, and all online exams. The D2L course also has a general course information folder in the “Content Browser” section, containing syllabus/schedule, required reading resources, papers, grades, and other important course information. In addition, for paper presentation assignments, peer-reviewed journal articles on D2L will be assigned to teams to present. All other students not presenting are required to read the journal articles on D2L.

Synaptic Transmission (Merliney & Fanselow, 2019, 1st ed.): This textbook is required for this course. It covers a broad summary of the neurobiology and neurophysiology of synaptic transmission, explores the fundamental hypotheses of synaptic transmission, and is a strong foundation for the understanding of how neurons communicate.

Paperback ISBN: 9780128153208

eBook ISBN: 9780128153215

Grades: Student grades will be based on their performance on:

- 1) Exams (3) – 100 pts each:** Each of three exams will be long essay format (3-4 questions each) and will be conducted online in D2L. Each exam will be available from Sun at 9am and due Sun by midnight. You will have 3 h to complete the exam. Exam 3 is not a cumulative exam.
- 2) Student Presentations (2) – 75 pts each:** Students will individually present specific sections and figures from a peer-reviewed journal article. Students will present to the class for 5-10 minutes outlining: 1) the hypothesis, 2) method, 3) result, and 4) interpretation of a figure (or subset of figures). See the grading rubric evaluation at the end of this syllabus. Students are strongly encouraged to meet with me during office hours prior to their presentation to discuss their presentation.
- 3) Figure Facts assignments (8) – 5 pts each:** This will consist of a “Figure Facts” form covering the presented material that is to-be-filled-out prior to recitation. Submission of the completed form on D2L is required to receive pts. A reasonable effort is required to receive pts for these assignments. Pts are awarded on pass/fail.

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4) **Participation – 60 pts:** Attendance at lecture and paper presentations is mandatory and chronic absences and tardiness will result in loss of points. Lectures will cover required reading material for the exams. Paper presentations will cover material related to lecture and also cover material for the exams. Participation during paper presentations also requires completion of a short assignment prior to recitation. Participation will also be based on participation during paper presentations and lectures. Students are strongly encouraged to ask questions to increase their participation grade.

Total points available = 550

Grading scale: The anticipated scale will be:

Note: all grades are rounded down

4.0 = > 92%
 3.5 = 92 – 87
 3.0 = 86 – 80
 2.5 = 79 – 73
 2.0 = 72 – 67
 0.0 = < 65%

Student Presentation Evaluation Rubric:

Component	Points	Excellent	Satisfactory	Poor
Hypothesis: State the specific hypothesis of the figure and how this connects to the overall hypothesis.	10	Describes the research question, how this connects to the overall hypothesis of the article, and how the authors' approach will address the question.	Describes the hypothesis without specific context to the overall hypothesis. Vague description of authors' approach.	Does not adequately or accurately describe hypotheses or approach.
Methods: Describe the methods in detail, including a short description of the technique, samples/animals used, assays, procedures, timeline, etc. Explain how these methods will test the specific hypothesis.	20	Succinctly explains pertinent details necessary to understand the method and how the method will answer the research question, without providing unnecessary details.	Adequately explains the method; includes many unnecessary details that do not supplement the understanding of the method or how the methods address the research question.	Does not explain the necessary details of the method. Does not accurately explain how the methods will address the research question.
Figure Description: Describe the figure, including detailed explanation of any images, diagrams, and graphs. For graphs state the x-axis, y-axis, and any bars or lines (if applicable). State the statistical test and significant differences between groups (if applicable).	10	Provides the necessary details to understand each component of the figure. Demonstrates a deep understanding of the method and result that is being displayed in the figure.	Provides an overall understanding of the figure, but may be missing key details for others to understand the figure.	Poorly describes the figure without adequately describing the necessary details. Does not appear to understand the method or results.
Results: State the specific finding for each figure. If there are multiple graphs or images for each figure, state the finding for each. Report whether these findings are statistically significant.	20	Demonstrates significant understanding of the authors' findings from the figure and applies the finding in context to the hypothesis.	Describes the findings and shows a moderate understanding of how they relate to the research question.	Does not accurately or adequately understand the finding and does not provide a clear connection of the findings to the research question.
Conclusion: Report whether each finding was supported by the specific hypothesis. State whether the authors determined if the finding supported the overall hypothesis. Describe the authors' interpretation of these findings.	15	Excellent explains how the findings supported the specific hypothesis. Provides a "big picture" of these findings support the overall hypothesis. Explains the context of these findings.	Provides an adequate explanation of how the findings support the specific hypothesis, but only makes a vague connection to the overall findings without significant contextual interpretation.	Does not adequately or accurately state how the findings support the specific and/or overall hypothesis Provides no contextual interpretation.

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HONORS OPTION:

To receive an Honors Option for NEU 440, students must achieve a 4.0 overall grade in the class and complete an additional assignment. Students are required to write a “News and Views” style article based on one of the primary literature presentations made throughout the semester. The format of the article is 2 pages, single spaced, extensive citation, with figures or illustrations optional. The article **should NOT be a summary of the primary literature presentation; no more than one or two short paragraphs should be used to explain the results of the primary article.** Rather, the goal should be to introduce the problems that the primary article is addressing by summarizing the state of the field prior to the work in the primary article, and then to integrate the results of the primary article with the field and speculate as to future studies that may stem from this work. Successful assignments will make copious use of other *peer-reviewed primary literature* (rather than textbooks or Wikipedia-like sources), and will display a deep understanding of the field and of the interpretations of the primary article. An example of a successful assignment will be provided by the instructor. Instructor makes the final decision on a successful assignment.

The assignment is due on April 21, 2022. However, assignments turned in on or before March 31st, will be reviewed and returned to the student with suggestions for improvement, making successful completion of the assignment much more likely.

COURSE AND UNIVERSITY POLICIES:

Class absences and missed assignments

There are occasionally legitimate reasons for class absences or difficulty meeting assignment deadlines (medical school or graduate school interviews, for example). Students who have a schedule conflict with class attendance or completion of a scheduled assignment must inform the instructor of the reason **prior to** the anticipated absence or missed assignment to make alternative arrangements for assignment completion. Failure to do this will result in 0 points for missed assignments.

If an unanticipated illness or other emergency causes a student to miss an assignment, the student will have the opportunity to complete the missed assignment if appropriate documentation is provided; however see Covid-related illness section below. Failure to do this will result in 0 points for missed assignments. Exams must be made up within one week. Missed paper presentations will likely result in you being placed into another presentation later in the semester or having present to me individually within one week.

Class Recordings

Meetings of this course may be recorded. Recordings may be available to students registered for this class. This is intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Recordings may not be reproduced, shared with those not in the class, or uploaded to other online environments. Doing so may result in disciplinary action. If the instructor or another University office plan other uses for the recordings beyond this class, students identifiable in the recordings will be notified to request consent prior to such use.

Plagiarism

Plagiarism is using someone else’s ideas or words without crediting the source. However, paraphrasing or quoting sources is very common and encouraged in science, as long as the

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source is credited. This means that plagiarism is very avoidable. If you copy someone else's words directly, those words must be enclosed within quotation marks and cited; the ideas or words of others, paraphrased and written in *your own words*, must be cited but do not require quotation marks. This is true regardless of the source – books, journal articles, and web pages all must be cited if you use ideas or words from them. Source can be hard copy or electronic, and the author might not be identified. Regardless of the details, you must cite your source in such a way that it can be found by someone else.

Plagiarism is considered to be academic theft, and committing plagiarism is a significant violation of MSU academic integrity policies. Students who plagiarize any part of an assignment may receive a penalty, including, but not limited to, a failing grade on the assignment or a failing grade in the course; expulsion from the program is possible.

MSU Policies: This course adheres to all applicable MSU policies as outlined in Policies, Regulations and Ordinances Regarding Academic Honesty and Integrity (<https://www.msu.edu/unit/ombud/RegsOrdsPolicies.html>). In addition, the course adheres to the all-university policy on Integrity of Scholarship and Grades and Ordinance 17.00, Examinations as outlined in Spartan Life Online (<http://splife.studentlife.msu.edu/>) and/or the MSU Web site (<http://www.msu.edu.>).

Understand When You May Drop This Course

It is the student's responsibility to understand when they need to consider un-enrolling from a course. Refer to the [Michigan State University Office of the Registrar](#) for important dates and deadlines. The last day to add this course is the end of the first week of classes. Please see the link above for drop date deadlines. You should immediately make a copy of your amended schedule to verify you have added or dropped this course.

Inform Your Instructor of Any Accommodations Needed

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. If you have a documented disability and verification from the [Resource Center for Persons with Disabilities](#) (RCPD), and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to RCPD and meet with an RCPD specialist to request special accommodation *before* classes start.

Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation ("VISA") form. Please present this form to the instructor at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible. RCPD is located in 120 Bessey Hall, near the center of the Michigan State University campus, on the southwest corner of Farm Lane and Auditorium Road. RCPD may be contacted by phone at (517) 884-7273 (884-RCPD), or [via their website](http://www.rcpd.msu.edu) (<http://www.rcpd.msu.edu>).

Commitment to Integrity: Academic Honesty

Article 2.3.3 of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, this course will adhere to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See [Spartan Life: Student Handbook and Resource Guide](#) and/or the [MSU Web site: \[www.msu.edu\]\(http://www.msu.edu\)](#).)

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Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also <http://www.msu.edu/unit/ombud/dishonestyFAQ.html>).

MSU COVID DIRECTIVES:

Face Coverings/Masks

Individuals with COVID-19 are highly infectious for up to two days before the onset of symptoms. Thus, face coverings are a crucial public health measure and help protect others by reducing exposure to droplets if someone is unknowingly infected with COVID-19. Wearing a face covering, whether or not you feel ill or have been diagnosed with COVID-19, is critical to maintaining everyone's health and safety.

Face coverings must be worn by everyone indoors (including all faculty, staff, students, vendors and visitors) while you are on property owned or governed by MSU or while participating in MSU-related or MSU-sponsored activities. If you have a medical condition that may prevent you from safely wearing a face covering, you should contact [MSU's Resource Center for Persons with Disabilities](#) to begin the accommodation process. From the APUE (8/20), individuals "must receive documents attesting to their exemption from the mask mandate before entering an MSU building without a mask."

Students should "refrain from eating or drinking during class to avoid having to remove their masks. If they do consume food or drinks inside, they should remove the mask only to take a sip of beverage or a bite to eat, and they must replace the mask properly between each bite and sip." (from the APUE (8/20/21))

Face coverings should:

1. be non-medical grade to maintain supplies for health care use,
2. fit snugly against the side of your face,
3. cover your nose and mouth,
4. be secured with ties or ear loops, **and**
5. allow for breathing without restriction.

Cloth face coverings should only be worn for one day at a time, and they must be properly hand washed or laundered with soap/detergent before subsequent use. Face coverings may vary (for example, disposable non-medical masks are acceptable).

If you refuse to wear a mask even after being asked, you will be asked to leave the classroom for disruptive behavior. Non-compliance with the mask requirement [causing] disruption in the classroom will result in the initiation of disciplinary action, which could lead to removal from the university.

Self-Monitoring

This syllabus is tentative and subject to change at the instructor's discretion.

Symptoms may appear 2-14 days after exposure to the virus. Using whichever tools and processes are made available by the university, pay attention for the appearance of possible flu-like symptoms, including:

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

This list may not include all possible symptoms. Public health officials, including the CDC, will continue to update the list as they learn more about COVID-19. If you begin exhibiting symptoms, stay home and contact the Olin Health Center's 24-hour nurse line at (517) 353-5557 or your personal health care provider.

Do not come to class if experiencing COVID symptoms!

Exposure

The best way to prevent illness is to avoid being exposed to the virus. If you believe you have been exposed to someone with COVID-19, you should self-quarantine and monitor your symptoms. If feeling ill, students should contact MSU's COVID-19 hotline at 855-958-2678 or contact their health care provider.

MSU will test any faculty, staff, or student who becomes symptomatic after returning to campus. You may also get tested through the State of Michigan Coronavirus Testing Hotline. Call (888) 535-6136 from 8 a.m. to 5 p.m., Monday through Friday, and press 1 to be connected to an operator who can help you find a nearby location and schedule an appointment. Or, visit Michigan.gov/CoronavirusTest to find locations near you. There are many locations where you can get tested at no cost.

Positive Test for COVID-19

"Anyone diagnosed with COVID-19 should isolate from others for at least 10 days after symptoms first appear and for 24 hours after fever has subsided without the use of fever-reducing medications and other related symptoms are improving. If you tested positive for COVID-19 but showed no symptoms, you should isolate for 10 days after your positive COVID-19 test." (from the APUE, 8/20/21)

Adherence to Public Health Guidance and Cooperation with Public Health Authorities

For the protection of the entire community, MSU expects all faculty, staff, and students to follow all applicable state and public health guidance and cooperate with public health authorities, including, but not limited to, participating in contact tracing efforts.

Adherence to Signage and Instructions

To protect yourself and others, faculty, staff, and students must (a) look for instructional signs posted by MSU or public health authorities, (b) observe instructions from MSU or public health authorities that are emailed to your "msu.edu" account, and (c) follow those instructions.

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